

WHAT IS CLAIMED IS:

1. A magnetic recording medium comprising:
a non-magnetic substrate;
at least a non-magnetic under-layer on said non-magnetic substrate;
at least a first non-magnetic metallic intermediate layer on said non-magnetic under-layer;
at least a second non-magnetic metallic intermediate layer on said first non-magnetic metallic intermediate layer;
at least a magnetic layer on said second non-magnetic metallic intermediate layer;
at least a protective film and a liquid lubricant layer sequentially laminated on said magnetic layer;
said magnetic layer being a plurality of ferromagnetic grains and non-magnetic grain boundaries;
said plurality of ferromagnetic grains containing at least cobalt and platinum;
said non-magnetic grain boundaries including at least an oxide substantially surrounding said plurality of ferromagnetic grains;
said first intermediate layer containing oxygen and being composed of at least one element selected from the group consisting of Ru, Re and Os; and
said second intermediate layer being at least a CoCr alloy including at least one element selected from the group consisting of Nb, Mo, Ru, Rh, Pd, Ta, W, Re, Os, Ir and Pt.
2. A magnetic recording medium according to claim 1, wherein:
said non-magnetic substrate is at least a first plastic;
said first plastic being at least one of a polycarbonate and a polyolefin.

3. A magnetic recording medium according to claim 1, wherein:

a crystal structure of said second intermediate layer is hexagonal close packed;

a crystal structure of said plurality of ferromagnetic grains in said magnetic layer is hexagonal close packed; and

a misfit between lattice constants of unit cells of said second intermediate layer and unit cells of said plurality of ferromagnetic grains is within $\pm 3\%$.

4. A magnetic recording medium according to claim 1, wherein:

said under-layer is at least one of chromium and a chromium alloy; and at least one of a (200) lattice plane and a (211) lattice plane in said under-layer is preferentially oriented in parallel with a film surface of said under-layer.

5. A method for manufacturing a magnetic recording medium comprising the steps of:

laminating at least a non-magnetic under-layer on a non-magnetic substrate;

laminating at least a first non-magnetic metallic intermediate layer on said non-magnetic under-layer;

laminating at least a second non-magnetic metallic intermediate layer on said first non-magnetic metallic intermediate layer;

laminating at least a magnetic layer on said second non-magnetic metallic intermediate layer;

laminating a protective film on said magnetic layer;

laminating a liquid lubricant layer on said protective film;

said step of laminating said magnetic layer including laminating to form at least ferromagnetic grains and non-magnetic grain boundaries surrounding said grains, said grains being at least one of cobalt and platinum and said grain boundaries being at least an oxide;

said step of laminating said first intermediate layer including laminating to form said first intermediate layer from oxygen and at least one element selected from the group consisting of Ru, Re, and Os; and

said step of laminating said second intermediate layer including laminating to form said second intermediate layer from a CoCr alloy containing at least one element selected from the group consisting of Nb, Mo, Ru, Rh, Pd, Ta, W, Re, Os, Ir and Pt.

6. A method for manufacturing a magnetic recording medium according to claim 5, wherein:

said non-magnetic substrate is at least a first plastic; and

said first plastic being at least one of a polycarbonate and a polyolefin.

7. A method for manufacturing a magnetic recording medium according to claim 5, wherein:

said step of laminating said second intermediate layer including laminating to form a crystal structure of said second intermediate layer as hexagonal close packed;

said step of laminating said magnetic layer including laminating to form a crystal structure of said ferromagnetic grains in said magnetic layer as hexagonal close packed; and

said steps of laminating said second intermediate layer and said magnetic layer including laminating to form a misfit between lattice constants of unit cells of said second intermediate layer and unit cells of said ferromagnetic grains is within $\pm 3\%$.

8. A method for manufacturing a magnetic recording medium according to claim 5, wherein:

said step of laminating said under-layer including laminating to form said under-layer from at least one of chromium and a chromium alloy; and

said step of laminating said under-layer including laminating to form at least one of a (200) lattice plane and a (211) lattice plane in said under-layer as preferentially oriented in parallel with a film surface of said under-layer.

9. A magnetic recording device comprising: a magnetic recording medium as defined by claim 1.

10. A magnetic recording medium comprising:
a non-magnetic substrate;
at least a non-magnetic under-layer on said non-magnetic substrate;
at least a first non-magnetic metallic intermediate layer on said non-magnetic under-layer;

at least a second non-magnetic metallic intermediate layer on said first non-magnetic metallic intermediate layer;

at least a magnetic layer on said second non-magnetic metallic intermediate layer;

at least a protective film and a liquid lubricant layer sequentially laminated on said magnetic layer;

said magnetic layer being a plurality of ferromagnetic grains and non-magnetic grain boundaries;

said plurality of ferromagnetic grains containing at least cobalt and platinum;

said non-magnetic grain boundaries including at least an oxide substantially surrounding said plurality of ferromagnetic grains;

said first intermediate layer being at least a CoCr alloy including at least one element selected from the group consisting of Nb, Mo, Ru, Rh, Pd, Ta, W, Re, Os, Ir and Pt; and

said second intermediate layer containing oxygen and being composed of at least one element selected from the group consisting of Ru, Re and Os.

11. A magnetic recording medium according to claim 10, wherein:

said non-magnetic substrate is at least a first plastic;

said first plastic being at least one of a polycarbonate or polyolefin.

12. A magnetic recording medium according to claim 10, wherein:

a crystal structure of said first intermediate layer is hexagonal close packed;

a crystal structure of said second intermediate layer is hexagonal close packed; and

a misfit between lattice constants of unit cells of said first intermediate layer and unit cells of said second intermediate layer is within $\pm 3\%$.

13. A magnetic recording medium according to claim 10, wherein:

said under-layer is at least one of chromium and a chromium alloy; and

at least one of a (200) lattice plane and a (211) lattice plane in said under layer is preferentially oriented in parallel with a film surface of said under-layer.

14. A method for manufacturing a magnetic recording medium comprising the steps of:

laminating at least a non-magnetic under-layer on a non-magnetic substrate;

laminating at least a first non-magnetic metallic intermediate layer on said non-magnetic under-layer;

laminating at least a second non-magnetic metallic intermediate layer on said first non-magnetic metallic intermediate layer;

laminating at least a magnetic layer on said second non-magnetic metallic intermediate layer;

laminating a protective film on said magnetic layer;

laminating a liquid lubricant layer on said protective film;

5 said step of laminating said magnetic layer including laminating to form at least ferromagnetic grains and non-magnetic grain boundaries surrounding said grains, said grains being at least one of cobalt and platinum and said grain boundaries being at least an oxide;

10 said step of laminating said first intermediate layer including laminating to form said first intermediate layer from a CoCr alloy containing at least one element selected from the group consisting of Nb, Mo, Ru, Rh, Pd, Ta, W, Re, Os, Ir and Pt; and

15 said step of laminating said second intermediate layer including laminating to form said second intermediate layer from oxygen and at least one element selected from the group consisting of Ru, Re, and Os.

20 15. A method for manufacturing a magnetic recording medium according to claim 14, wherein:

 said non-magnetic substrate is at least a first plastic; and

 said first plastic is at least one of a polycarbonate and a polyolefin.

25 16. A method for manufacturing a magnetic recording medium according to claim 14, wherein:

 said step of laminating said first intermediate layer including laminating to form a crystal structure of said first intermediate layer as hexagonal close packed;

said step of laminating said second intermediate layer including laminating to form a crystal structure of said second intermediate layer as hexagonal close packed; and

a misfit between lattice constants of unit cells of said first intermediate layer and unit cells of said second intermediate layer is within $\pm 3\%$.

17. A method for manufacturing a magnetic recording medium according to claim 14, wherein:

said step of laminating said under-layer including laminating to form said under-layer from at least one of chromium and a chromium alloy; and

said step of laminating said under-layer including laminating to form at least one of a (200) lattice plane and a (211) lattice plane in said under-layer as preferentially oriented in parallel with a film surface of said under-layer.

18. A magnetic recording device comprising: a magnetic recording medium as defined by claim 10.